Demitz & Mueller

Economical Design Of a Medium Span Fink Trussed Roof

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THE ECONOMICAL DESIGN OF A MEDIUM SPAN FINK TRUSSED ROOF

BY

CHARLES H. DEMITZ

AND

WALTER MUELLER

THESIS FOR THE DEGREE OF BACHELOR OF SCIENCE
IN ARCHITECTURAL ENGINEERING

COLLEGE OF ENGINEERING

UNIVERSITY OF ILLINOIS

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THIS IS TO CERTIFY THAT THE THESIS PREPARED UNDER MY SUPERVISION BY

WALTER HERMAN MUELLER

ENTITLED THE ECONOMICAL DESIGN OF A MEDIUM SPAN FINK TRUSSED ROOF

IS APPROVED BY ME AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE DEGREE

OF Bachelor of Science in Architectural Engineering

N. Clifford Ricker

HEAD OF DEPARTMENT OF Architecture

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On the design of steel roof trusses of a building for which a roof of great pitch is not objectionable, very little attention is paid to two essential points. First, the most economical rise, Second the most economical spacing centre to centre of trusses.

It is evident that there must be some point, for each of the above principals, where the roof truss, as well as the rafter and purlin systems, pass from an economical, to an expensive feature of the design. For instance, given a building 80' wide and 160' long. The engineer may use almost any spacing or rise for his trusses. Practise and his personal experience, would of course, confine him to some reasonable decision. If he had the time, it is probable two or more designs would be made, and the economical one employed. This, however, is seldom done, or if done, is at its best, a long,

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and therefore a costly method of procedure.

If, however, some information could be obtained, either in the form of tables, or curves, to which the designer need only refer, and knowing the span of his trusses, determine at once the rise and spacing which would give an economical design, the matter would not only be simplified and therefore made less expensive, but the engineer would have the satisfaction of knowing, that upon the standpoints of his profession, the design was a perfect one, and the owner, has the knowledge that he had not been called upon to pay for any unnecessary pound of steel.

It is understood, of course, that some problems will not admit of much variation regarding the points at issue, but, after a careful analysis of some existing designs, we

believe this investigation to be, at least justifiable.

The purpose is, therefore, to determine some data, from which may be obtained, for a span of 80' center to center of trusses, the size and spacing of trusses, which will give the most economical truss, purlin and rafter systems. In some cases, the weights of trusses may govern, in others, the weight of the purlins and rafters.

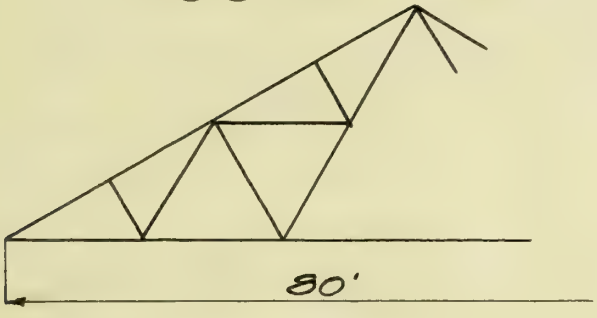
In the field, the word "medium" is understood to refer to trusses of spans ranging from 65' to 95'. A truss of 80' representing the average, and assuming that the results obtained will hold for trusses of spans between the above limits.

Also, the use of any roof covering other than that used in this investigation, will simply increase the dead load stress proportionately and the size of purlins and rafters. The increase in

weight of truss will nearly equal that of the pulmonic and aortic systoles, and effect only a slight if any, change in the results.

Method of Procedure

The truss employed in this investigation was of the Fink type, consisting of eight (8) panels as shown. The Fink being the most popular style for buildings to which this discussion might be applied



Five different rises were taken. i.e. 13⅓', 20' & 30'; & five different distances center to center of trusses, 10', 15', 20', 25' & 30'.

The following loads were assumed.

Corrugated Iron on ⅞" sheathing (L.L.P.) 11# D'

Snow per sq. ft. of horizontal surface 20#

Wind, per sq. ft. of vertical surface 30#

Weight of truss was approximated from Merriman & Jacoby's formula $w = \frac{3}{4} A L \left(1 + \frac{L}{10}\right)$

where w = wt. of truss in pounds.
A = center to center dist. ft.
L = span in ft.

For maximum loading, assumed as acting at any time, snow on entire roof surface, wind on any half, and total permanent load. This, at first glance, may seem excessive, if we consider that the snow load may be eliminated from that side of the truss upon which the wind is acting. But if a frost would follow a heavy fall of snow or rain, this might form a thick frozen mass, which the wind could not blow from the surface, and the steel work would really be subjected to a greater load than included in the above assumption.

Coefficients used for finding the various normal wind loads were obtained from Harris Roof Trusses.

Steel work

Safe resistance of steel taken from "Fetcham's Mill Building" Tension 8 tons per square inch Compression $8 - .4\frac{l}{r}$ where l = length in feet and r = least

radius of gyration in inches. Curves on sheets #1 and #2 were plotted from the above formula and give, more readily, the safe working strengths of single and double angle struts, for all values of $\frac{l}{r}$

Value of shop driven rivet in bearing = 20000 #□" and for shear, 10000 #□". Value of field bolt in bearing = 14000 #□" and for shear, 7000 #□"

$\frac{3}{4}$" rivets were used throughout, the minimum size leg for angles being $2\frac{1}{2}$", and only standard sections as given in Cambria or Carnegie Handbooks were used.

In order to secure regularity in results, all the trusses were designed with compared and even chords.

By working out one case, the method will be more fully explained. Let us consider the truss 80'-13⅓'-10'. Here the loads were as follows.

Corrugated Iron on Sheathing = 11 #□'
Snow, on roof surface = 19 #□'
Wind, maximal = 12.5 #□'

Knowing the thickness of the sheathing, $\frac{7}{8}$", the first step was to determine the spacing of rafters. To be on the safe side, sheathing was considered as extending over any space only, that is, from one rafter to the next, thus allowing for the use of short pieces, as is often done, to fill out.

Merriman and Jacoby's formulas for sheathing are

$$l = \sqrt{\frac{5600 t^2}{3w}} \quad \text{for bracing}$$

$$l = \sqrt[3]{\frac{6800 t^3}{3w}} \quad \text{for bending.}$$

where l = maximum safe distance center to center of rafters, in feet, t = thickness of sheathing in inches, and w = load per sq. ft. in pounds.

In this case $w = (11 + 19)\cos\theta + 12.5 = 41$ # □'

$$l \text{ for bracing} = \sqrt{\frac{5600 \times \left(\frac{7}{8}\right)^2}{3 \times 41}} = 5.92'$$

$$l \text{ " bending} = \sqrt[3]{\frac{6800 \times \left(\frac{7}{8}\right)^3}{3 \times 41}} = 3.33'$$

The value for bending will here govern, and for a distance of 10' center to center of

trusses, the rafters will be spaced 3.33'

Rafters.

In designing rafters, two kinds of stresses must be considered. First, stresses due to transverse loading, acting normal to roof surface. Second, stress due to longitudinal compression, increasing from zero at the top of rafter, to maximum at the bottom. Intensity of stress at the middle point will be one half the maximum.

Stress due to transverse loading.

$3.33' \times 10.54' \times 41\ \#/\square' = 1440\# = .72$ tons.

10.54 being the length of rafter.

$\frac{I}{e}$ = section modulus

I = moment of inertia

L = length of rafter in feet

W = total load on rafter in tons.

$$\frac{I}{e} = \frac{3WL}{16} = \frac{3 \times .72 \times 10.54}{16} = 1.42$$

$$I = \frac{3WL^2}{56} = \frac{3 \times .72 \times 10.54^2}{56} = 4.28$$

4" $7\frac{1}{2}\#$ I, $\frac{I}{e} = 3.$, $I = 6.$ area $= 2.21\ \square"$

5" $6\frac{1}{2}\#$ I, " $= 3.$, " $= 7.4$ " $= 1.95\ \square"$

the channel, bring the lighter in weight, is the desirable section.

Stress due to longitudinal compression.

Total load = sum of dead and snow = 11 + 19 = 30 #D'

component acting along roofing = 30 × Sin θ = 30 × .316 = 9.48 #D" Area supported by one rafter = 10.54 × 3.33' = 35.11 D'

Longitudinal compression at middle of rafter =

$$\frac{35.11 \times 9.48}{2} = 166^{\#} = .083 \text{ tons}$$

Unit fibre stress = $\frac{.083}{1.95} = .043$ tons per square inch.

Let w = total normal load on rafter in tons

l = length of rafter in feet.

F = allowable fibre stress per square inch. equals 8 tons less stress due to compression longitudinal.

E = modulus of elasticity which for steel = 14000 tons.

r = limit of safe deflection of rafter, and equals .03 inch. per foot of length

Then $\frac{I}{c} = \frac{3wl}{2F}$, $I = \frac{45wl^2}{2Er}$

$F = 8. - .043 = 7.957$

$\frac{I}{c} = \frac{3 \times .72 \times 10.54}{2 \times 7.957} = 1.43$

$I = \frac{45 \times .72 \times 10.54^2}{2 \times 14000 \times .03} = 4.28$

5" 6½# I. The section assumed, satisfies these values, and will be used for rafters.

Design of Purlin.

Load per panel =

Dead load on sheeting

$11^{\#\square'} \times 10.54' \times 10' = 1159^{\#}$

Snow load = $19^{\#\square'} \times 10.54' \times 10' = 2003^{\#}$

3 Rafters - 5" 6½# I's - $10.54' \text{ lg} = \underline{206^{\#}}$

Total dead load = $3368^{\#}$

$= 1.68$ tons

Normal wind load per panel equals. $12.5^{\#\square'} \times 10.54' \times 10' = 1318^{\#}$

$= .65$ tons.

Let V = total permanent dead snow load on purlin, in tons.

N = normal wind load on purlin in tons

Then $W' = V \cos\theta + N$ = total load acting normal to roof surface.

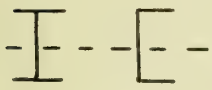
$W'' = V \sin\theta$ = total load acting along roof slope.

$W' = 1.68 \times .949 + .65 = 2.29$ tons.

$W'' = 1.68 \times .316 = .53$ "

$\frac{I}{c} = \frac{3W'L}{16} = \frac{3 \times 2.29 \times 10}{16} = 4.29$

$I = \frac{3W'L^2}{56} = \frac{3 \times 2.29 \times 10}{56} = 12.22$



Considering axis 1–1

6" 12¼# I, $\frac{I}{c} = 7.3$, $I = 21.8$

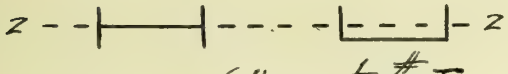
6" 8# I, $\frac{I}{c} = 4.3$, $I = 13.$

substituting W"

$\frac{I}{c} = \frac{3W''L}{16} = \frac{3 \times .53 \times 10}{16} = .99$

$I = \frac{3W''L^2}{56} = \frac{3 \times .53 \times 10^2}{56} = 2.74$

The actual values of $\frac{I}{c}$ and I exceed the allowable for the sections formed above, which are as follows.



6" 12¼# I, $\frac{I}{c} = 1.11$, $I = 1.85$

6" 8# I, " = .5, " = .7

This means that either the size of purlins must be increased, or tie rods must be used. Tie rods being the cheaper, this method will be employed. First by one rod at center of length of purlin. This changes the original purlin 10' long, to two purlins, each

5' long. The tie rod is considered as supporting the purlin at the middle point, as far as any force acting along the roof slope is concerned.

Since the purlin is decreased by one half the length, the load is decreased in like manner. And if, by substituting these new values of W" and L, in the formulae, results are obtained which are less than the allowable values of I and $\frac{I}{c}$, one tie rod will suffice. If the results are still in excess, two rods must be used. The load and length becoming one third (1/3) the original values. Assuming one (1) tie rod.

$$\frac{I}{c} = \frac{3 \times .27 \times 5}{16} = .25$$

$$I = \frac{3 \times .27 \times 5^2}{56} = .36$$

The allowable exceed the actual, and one tie rod will be sufficient.

The 6" 8# I being lighter than the 6" I, the former will

be used for Purlin.

Ridge Purlin.

This member must be designed to take a full panel of dead and snow loads and one half panel of wind. Also stress thrown in by the tie rods, The latter being concentrated and the former uniform. Values of I and $\frac{I}{c}$ are found seperately and then added together. The ridge Purlin being made good for the table amount

Uniform load

Corr. Rafter, Sheathing, Rafters and Snow = 3368# = 1.68 tons

Vertical component of wind

$30 \times 10 \times \frac{10.54}{2} \times .393 = 620\# = .31$ tons.

total uniform load = 1.68 + .31 = 1.99 tons.

$$\frac{I}{c} = \frac{3 \times 1.99 \times 10}{16} = 3.74$$

$$I = \frac{3 \times 1.99 \times 10^2}{56} = 10.7$$

Concentrated Load

One tie rod takes .77 tons stress. (See design of Purlin) and since there are four (4) rods on each side of the

roof, multiplying by eight and the sin of θ, the vertical component will be

$.27 \times 8 \times .316 = .684$ tons

$M = \frac{SI}{c}$, $\frac{M}{S} = \frac{I}{c}$

$M = \frac{Wl}{4}$, and $S = 8$ tons

$$\frac{I}{c} = \frac{\frac{Wl}{4}}{8} = 2.57$$

$\frac{I}{c}$ for concentrated and uniform loads $= 2.57 + 3.74 = 6.31$

Assuming 6" 12¼# I, $\frac{I}{c} = 7.1$,

Solving for I, $c = 3$" for 6" I

$I = 2.57 \times 3 = 7.71$

Total $I = 7.71 + 10.7 = 18.41$

allowable for 6" 12¼# I = 21.8

Now considering weight of purlin.

$1.99 + \frac{12\frac{1}{4} \times 10}{2000} = 2.05$ tons.

$$\frac{I}{c} = \frac{3 \times 2.05 \times 10}{16} = 3.85$$

$$I = \frac{3 \times 2.05 \times 10^2}{56} = 11.$$

Total value of $\frac{I}{c} = 3.85 + 2.57 = 6.42$

" " " $I = 11 + 7.71 = 18.71$

6" 12¼# I satisfies these

values and will be used as ridge purlin.

Tie rods will be ½" diam. The actual required size would be much less than this, but for sake of appearance, it is not wise to use a smaller rod.

Truss Load per Panel Point.

Corrugated Iron on Sheathing
$11 \times 10' \times 10.54' = 1159$ #

3 Rafters 5" 6½ # S, 10.54' long = 206
1 Purlin 6" 8 # S – 10' " = 80
1445 #

Weight of Truss per Merriman and Jacoby's formula

$$w = \frac{3}{4} FL\left(1 + \frac{L}{10}\right) = \frac{3}{4} \times 10 \times 80\left(1 + \frac{80}{10}\right)$$

$$w = 5400 \text{ \#}$$

Equals $\frac{5400}{8} = 675$ # per Panel

Total dead load per Panel
$1445 + 675 = 2120$ #

Snow Load = $19 \times 10' \times 10.54' = 2003$ #

Normal Wind Load
$12.5 \times 10' \times 10.54' = 1318$ #

The dead, snow and wind load stresses were found by means of the usual stress diagrams. The tabulation sheets, which are self explanatory, show these results.

It will be noticed, from the column "Excess Stress," that the weights of truss, as approximated by Merriman and Jacoby's formula, always exceeded the actual weights as designed. This may be attributed to the fact that, the formula, though still used, was deduced when the strength of steel was not so well known as it is today, and consequently, steel construction was made much stronger, and heavy, than is done in modern practice.

Cum sheets #3, #4 and #5 give the weights of truss, purlin and rafters, for 13½', 20' and 30' rises respectively, for the five different distances center to center of trusses.

Sheet #6 gives the weights of details in per cent of the

center line weights of truss. Each truss was drawn out, to scale, and details designed. The above per cent was found by dividing the weight of details by the center line weight of the truss.

Sheet #7 gives the decrease of weight of truss, in per cent, from weights as determined by Merriman and Jacoby's formula.

Span 80' Rise 13 1/3' Distance centre to centre 10'

Member	Wind Load Stress Win'd Side	Wind Load Stress Leew'd Side	Dead Load Stress	Snow Load Stress	Maximum Stress	Centre Line Length	Assumed Section	Weight per Foot	Centre Line Weight	Actual Weight
A–1	+9200	+4550	+23350	+22100	+54650	10.54	2L 5x3½x⅜	10.4	219	224
B–2	+9200		+22600	+21400	+53200	"	"	"	219	213
C–5	+9200		+21800	+20580	+51580	"	"	"	219	219
D–6	+9200		+21190	+19930	+50320	"	"	"	219	219
1–2	+1320		+2010	+1890	+5220	3.85	1L 2½x2x 3/16	2.8	11	9
2–3	-2100		-3190	-3000	-8290	11.15	1L 2½x2½x 3/16	3.1	35	32
3–4	+2650		+4010	+3800	+10460	7.25	2L 2½x2½x¼	4.1	60	55
4–5	-2100		-3190	-3000	-8290	11.15	1L 2½x2½x 3/16	3.1	35	32
5–6	+1320		+2010	+1890	+5220	3.6	1L 2½x2x 3/16	2.8	10	9
6–7	-6280		-9200	-8700	-24180	11.1	2L 2½x2½x¼	4.1	91	89
4–7	-4200		-6230	-5900	-16330	11.1	2L 2½x2½x¼	4.1	91	90
X–1	-9730	-3900	-22200	-20900	-52830	11.15	2L 3½x3x 5/16	6.6	147	150
X–3	-7600		-19000	-17900	-44500	11.05	2L 3½x3x 5/16	6.6	146	146
X–7	-3500		-12780	-12000	-28280	17.8	2L 2½x2½x¼	4.1	146	146
Tie 7–7	0		0	0	0	13.3	1L 2½x2x¼	3.7	25	23
									1673	1662

for whole truss = 3346#

for whole truss = 3324#

Member	Weight of Details	Corrected Weight of Truss	Decrease in Dead Load Stress	Corrected Maximum Stress	Corrected Section	Weight per Foot	Corrected Centre Line Weight	Corrected Actual Weight	Final Total Weight
A–1	for whole truss = 421#		2275	+52375	O.K				for whole truss = 3713#
B–2		3324							
C–5		421							
D–6		3745#							
1–2									
2–3									
3–4			391	+10070	2L 2½x2x¼	3.7	54	50	
4–5									
5–6									
6–7									
4–7									
X–1			2165	-50670	2L 3x3x 5/16	6.1	136	139	
X–3									
X–7									
Tie 7–7									

Wt. of Details 12.7 per cent of centre line Wt. of truss = 421

Span 80' Rise 13 1/3' Distance centre to centre 15'

Member	Wind Load Stress Win'd Side	Wind Load Stress Leew'd Side	Dead Load Stress	Snow Load Stress	Maximum Stress	Centre Line Length	Assumed Section	Weight per Foot	Centre Line Weight	Actual Weight
A–1	+13840	+6850	+35900	+33160	+82890	10.54	2L3 6x4x 7/16	14.3	301	312
B–2	"		+34900	+32100	+80840	"	"	"	301	301
C–5	"		+33600	+30830	+78270	"	"	"	301	301
D–6	"		+32600	+30000	+76440	"	"	"	301	301
1–2	+1980		+3100	+2830	+7910	3.85	1L 2½x2x 3/16	2.8	11	7
2–3	-3160		-4900	-4500	-12560	11.15	1L 2½x2½x¼	4.1	46	42
3–4	+3990		+6190	+5850	+16030	7.25	2L3 2½x2½x¼	4.1	59	56
4–5	-3160		-4900	-4500	-12560	11.15	1L 2½x2½x¼	4.1	46	44
5–6	+1980		+3100	+2830	+7910	3.6	1L 2½x2x 3/16	2.8	10	9
6–7	-9420		-14190	-13000	-36610	11.1	2L3 3x3x¼	4.9	109	99
4–7	-6340		-9600	-8840	-24780	11.1	2L3 2½x2½x¼	4.1	91	88
X–1	-14660	-5890	-34150	-31450	-80260	11.15	2L3 5x3x 3/8	9.8	218	226
X–3	-11420		-29190	-26800	-67410	11.05	2L3 5x3x 3/8	9.8	218	218
X–7	-5270		-13600	-18000	-42870	17.8	2L3 3x3x 5/16	6.1	217	217
Tie 7–7	0		0	0	0	13.3	1L 3x3x¼	4.9	33	30
									2261	2251

for whole truss = 4522

for whole truss = 4502

Member	Weight of Details	Corrected Weight of Truss	Decrease in Dead Load Stress	Corrected Maximum Stress	Corrected Section	Weight per Foot	Corrected Centre Line Weight	Corrected Actual Weight	Final Total Weight
A–1	for whole truss = 524#	4502	4200	+78690	O.K				for whole truss = 5026
B–2		524							52
C–5		5026							4974#
D–6									
1–2									
2–3									
3–4			723	+15300	2L3 2½x2x 3/16	2.8	40	38	
4–5									
5–6									
6–7			1660	-34950	2L3 3x2½x¼	4.5	105	91	
4–7									
X–1			4100	-76260	O.K				
X–3									
X–7			2285	-40585	O.K				
Tie 7–7							2238		

for whole truss = 4476#

Wt. of Details in percent of center line Wt. of truss = 11.7

Span 80' Rise 13⅓' Distance centre to centre 20'

Member	Wind Load Stress Win'd Side	Wind Load Stress Leew'd Side	Dead Load Stress	Snow Load Stress	Maximum Stress	Centre Line Length	Assumed Section	Weight per Foot	Centre Line Weight	Actual Weight
A–1	18400	+9100	+49250	+44200	+111850	10.54	T		433	458
B–2	"		+47600	+42800	+108800	"			433	439
C–5	"		+46190	+41160	+105750	"	2L 6x4x⅜	12.3	439	432
D–6	"		+44600	+39860	+102860	"	1 Pl. 10x½	17.	432	440
1–2	2640		+4260	+3780	+10680	3.85	2L 2½x2x¼	3.7	28	24
2–3	4200		-6700	-6000	-16900	11.15	2L 2½x2½x¼	4.1	92	79
3–4	5300		+8500	+7600	+21400	7.26	2L 3x2½x¼	4.5	65	60
4–5	4200		-6700	-6000	-16900	11.15	2L 2½x2½x¼	4.1	92	77
5–6	2640		+4260	+3780	+10680	3.6	2L 2½x2x¼	3.7	27	23
6–7	-12560		-19400	-17400	-49360	11.1	2L 3½x3x⅜	6.6	147	134
4–7	-8400		-13200	-11800	-33400	11.1	2L 3x2½x¼	4.5	100	96
X–1	-19460	-7800	-46900	-41800	-108160	11.15	2L 6x3½x⅞	13.6	300	310
X–3	-15200		-40000	-35800	-91000	11.05	2L 6x3½x⅞	13.5	297	297
X–7	-7000		-26800	-24000	-57800	17.8	2L 4x3x⅝	7.2	263	263
Tie 7–7	0		0	0	0	13.3	2L 2½x2x¼	3.7	50	45
									3217	3184

for whole truss = 6434#

for whole truss 6368

Member	Weight of Details	Corrected Weight of Truss	Decrease in Dead Load Stress	Corrected Maximum Stress	Corrected Section	Weight per Foot	Corrected Centre Line Weight	Corrected Actual Weight	Final Total Weight
A–1	for whole truss = 696#		4300	+106950	O.K		433	458	
B–2		6368					433	433	6242
C–5		696					433	439	696
D–6		7064#					430	440	6938#
1–2							28	24	
2–3							92	79	
3–4			850	+20550	O.K		65	60	
4–5							92	77	
5–6							27	23	
6–7			1930	-47430	2L 3x3x⅜	6.1	136	124	
4–7			1310	-32090	O.K		100	96	
X–1			4660	-103500	2L 6x4x⅜	12.3	274	282	
X–3							272	272	
X–7			2665	-55140	O.K		263	263	
Tie 7–7							50	45	
							3155	3121	

for whole truss = 6310#

for whole truss = 6248#

Wt. of Details in per cent of centre line Wt. of truss = 11.0

Span 80' **Rise** 13⅓' **Distance centre to centre** 25'

Member	Wind Load Stress Win'd Side	Wind Load Stress Leew'd Side	Dead Load Stress	Snow Load Stress	Maximum Stress	Centre Line Length	Assumed Section	Weight per Foot	Centre Line Weight	Actual Weight
A–1	+23000	+10850	+64600	+55200	+142800	10.54	T	10.4 / 13.6 / 12.75 (47.75)	495	526
B–2	"		+62600	+53500	+139100	"			495	495
C–5	"		+60300	+51400	+134700	"	2L's 5x3½x⅜		495	495
D–6	"		+58500	+49800	+131300	"	1 PL 8x½ Web 10x⅜		495	495
1–2	+3350		+5570	+42	+13640	3.85	2L's 2½x2½x¼	4.1	28	24
2–3	-5230		-8800	-7500	-21530	11.15	2L's 2½x2½x¼	4.1	92	80
3–4	+6600		+11500	+9500	+27600	7.25	2L's 3x3x¼	4.9	71	65
4–5	-5230		-8800	-7500	-21530	11.15	2L's 2½x2½x¼	4.1	92	81
5–6	+3350		+5570	+4720	+13640	3.6	2L's 2½x2½x¼	4.1	27	24
6–7	-15600		-25490	-21700	-62790	11.1	2L's 3½x3x⅜	7.9	176	162
4–7	-10460		-17200	-14750	-42410	11.1	2L's 3x2½x⅜	5.6	125	120
X–1	-24300	-9300	-61500	-52100	-137900	11.15	2L's 6x4x½	16.2	360	375
X–3	-18950		-52500	-44800	-116250	11.05	2L's 6x4x½	16.2	357	357
X–7	-8730		-35000	-30000	-73730	17.8	2L's 5x3x⅜	9.8	348	348
Tie 7–7	0		0	0	0	13.3	2L's 3x3x¼	4.9	66	59
									3722	3706

for whole truss = 7444# — for whole truss = 7412#

Member	Weight of Details	Corrected Weight of Truss	Decrease in Dead Load Stress	Corrected Maximum Stress	Corrected Section	Weight per Foot	Corrected Centre Line Weight	Corrected Actual Weight	Final Total Weight
A–1	for whole truss = 1210#		6410	+136390	O.K		495	526	
B–2		7412					495	495	7178
C–5		1210					495	495	1210
D–6		8622#					495	495	8388#
1–2							28	24	
2–3							92	80	
3–4			1140	+26460	O.K.		71	65	
4–5							92	81	
5–6							27	24	
6–7			2520	-60270	2L's 3½x2½x⅝	6.1	135	125	
4–7			1710	-40700	O.K.		125	120	
X–1			6110	-131790	2L's 6x3½x½	15.3	342	354	
X–3					"	15.3	337	337	
X–7			3470	-70260	2L's 5x3½x⅝	8.7	309	309	
Tie 7–7							66	59	
							3604	3589	

for whole truss = 7208# — for whole truss = 7178#

Wt of Details in Percent of Center Line Wt of truss = 16.17

Span 80' Rise 13 1/3' Distance centre to centre 30'

Member	Wind Load Stress Win'd Side	Wind Load Stress Leew'd Side	Dead Load Stress	Snow Load Stress	Maximum Stress	Centre Line Length	Assumed Section	Weight per Foot	Centre Line Weight	Actual Weight
A–1	+27680	+13700	+81000	+66300	+174980	10.54	T		580	614
B–2	"		+78500	+64200	+170380	"	T	12.3	580	580
C–5	"		+76000	+61660	+165340	"	2L 6x4x 3/8	13.4	580	580
D–6	"		+73200	+60000	+160880	"	1PL 9x 7/16 Web 10x 1/2	17 (55.0)	580	580
1–2	+3960		+7000	+5660	+16620	3.85	2L 2½x2x 1/4	3.7	28	24
2–3	-6320		-11300	-9000	-26620	11.15	2L 2½x2½x 1/4	4.1	92	79
3–4	+7980		+13200	+11700	+33580	7.25	2L 3x3x 5/16	6.1	89	79
4–5	-6320		-11300	-9000	-26620	11.15	2L 2½x2½x 1/4	4.1	92	81
5–6	+3960		+7000	+5660	+16620	3.6	2L 2½x2x 1/4	3.7	27	23
6–7	-18840		-32000	-26000	-76840	11.1	2L 4x4x 3/8	9.8	216	196
4–7	-12680		-21600	-17680	-51960	11.1	2L 3½x3x 5/16	6.6	146	138
X–1	-29320	-11780	-77000	-62900	-169220	11.15	2[7"	19.75	440	460
X–3	-22840		-66000	-53600	-142440	11.05	2[7"	19.75	335	435
X–7	-10540		-44350	-36000	-90890	17.8	2[7"	12.25	336	436
Tie 7–7	0		0	0	-0	13.3	2L 3x3x 1/4	4.9	66	59
									4387	4364

for Whole truss = 8744#

for Whole truss = 8728#

Member	Weight of Details	Corrected Weight of Truss	Decrease in Dead Load Stress	Corrected Maximum Stress	Corrected Section	Weight per Foot	Corrected Centre Line Weight	Corrected Actual Weight	Final Total Weight
A–1	for Whole truss = 1430#	8728 1430 10158#	8300	+166680	T		560	593	8354 1430 9784#
B–2					2L 6x4x 3/8	12.3	560	560	
C–5					1PL 9x 3/8	11.48 (53.08)	560	560	
D–6					Web 10x 1/2	17	560	560	
1–2							28	24	
2–3							92	79	
3–4			1425	+32155	O.K		89	79	
4–5							92	81	
5–6							27	23	
6–7			3280	-73560	2L 5x3½x 5/16	8.7	194	174	
4–7			2230	-49730	O.K		146	132	
X–1			7890	-161330	2[8"	18.75	413	432	
X–3					2[8"	18.75	414	414	
X–7			4540	-86350	2[8"	11.25	401	401	
Tie 7–7							66	58	
							4208	4177	

for Whole truss = 8416#

for Whole truss = 8354#

Wt. of Details in percent of centerline Wt. of truss = 17.0

Span 80' Rise 20' Distance centre to centre 10'

Member	Wind Load Stress Win'd Side	Wind Load Stress Leew'd Side	Dead Load Stress	Snow Load Stress	Maximum Stress	Centre Line Length	Assumed Section	Weight per Foot	Centre Line Weight	Actual Weight
A–1	+8850	+4850	+17420	+15700	+41970	11.18	2L 5x3½x⅝	8.7	194	200
B–2	"		+16500	+14900	+40250	"	"	"	194	194
C–5	"		+15320	+13800	+37970	"	"	"	194	194
D–6	"		+14600	+13190	+36640	"	"	"	194	194
1–2	+1950		+1980	+1780	+5710	6.0	1L 2½x2½x¼	4.1	25	23
2–3	-2200		-2220	-2000	-6420	12.41	1L 2½x2½x¼	4.1	52	47
3–4	+3900		+4000	+3600	+11500	11.41	2L 3x2½x¼	4.5	103	99
4–5	-2200		-2220	-2000	-6420	12.5	1L 2½x2½x¼	4.1	51	47
5–6	+1950		+1980	+1780	+5710	5.71	1L 2½x2½x¼	4.1	23	22
6–7	-6550		-6700	-6030	-19280	12.5	2L 2½x2½x¼	4.1	102	98
4–7	-4380		-4470	-4040	-12890	12.5	2L 2½x2½x¼	4.1	102	100
X–1	-9900	-3200	-15730	-14160	-39790	12.64	2L 3x2½x⅝	5.6	142	145
X–3	-7700		-13460	-12150	-33310	12.36	2L 3x2½x⅝	5.6	139	139
X–7	3350		-9000	-8110	-20460	15.0	2L 2½x2½x¼	4.1	123	123
Tie 7–7	0		0	0	0	20.0	1L 2½x2x¼	3.7	27	35
									1675	1660

for whole truss = 3350

for whole truss = 3320

Member	Weight of Details	Corrected Weight of Truss	Decrease in Dead Load Stress	Corrected Maximum Stress	Corrected Section	Weight per Foot	Corrected Centre Line Weight	Corrected Actual Weight	Final Total Weight
A–1	for whole truss = 558#	3320 558 3878#	1490	+40480	O.K				
B–2							for whole truss = 3350	for whole truss = 3320	3837
C–5									
D–6									
1–2									
2–3									
3–4			340	+11160	O.K				
4–5									
5–6									
6–7									
4–7									
X–1			1340	-38450	O.K				
X–3									
X–7									
Tie 7–7									

Wt of Details 1/7 per cent of center line Wt of truss = 16.6

Span 80' **Rise** 20' **Distance centre to centre** 15'

Member	Wind Load Stress Win'd Side	Wind Load Stress Leew'd Side	Dead Load Stress	Snow Load Stress	Maximum Stress	Centre Line Length	Assumed Section	Weight per Foot	Centre Line Weight	Actual Weight
A–1	+13220	+7260	+27100	+23500	+63820	11.18	2L 6x3½x⅜	11.7	260	268
B–2	"		+25600	+22400	+61220	"	"	"	260	260
C–5	"		+23750	+20650	+57620	"	"	"	260	260 #
D–6	"		+22650	+19800	+55670	"	"	"	260 #	260
1–2	+2920		+3060	+2660	+8640	6.0	2L 2½x2x¼	3.7	44	41
2–3	-3290		-3450	-3000	-9740	12.61	1L 2½x2½x¼	4.1	52	48
3–4	+5850		+6200	+5400	+17450	11.41	2L 3½x2½x⅜	6.1	140	134
4–5	-3290		-3450	-3000	-9740	12.5	1L 2½x2½x¼	4.1	51	48
5–6	+2920		+3060	+2660	+8640	5.71	2L 2½x2x¼	3.7	42	39
6–7	-9800		-10400	-9050	-29250	12.5	2L 2½x2½x⅜	4.1	103	96
4–7	-6540		-6930	-6060	-19530	12.5	2L 2½x2½x¼	4.1	103	100
X–1	-14820	-4800	-24400	-21200	-60420	12.64	2L 3½x3x⅜	7.9	200	204
X–3	-11550		-20900	-18170	-50620	12.36	2L 3½x3x⅜	7.9	198	198
X–7	-5000		-13300	-12200	-31100	15.0	2L 3x2½x¼	4.5	135	135
Tie 7–7	0		0	0	0	20.0	1L 3x3x¼	4.9	42	47
									2157	2138

for whole truss = 4314 #

for whole truss = 4276 #

Member	Weight of Details	Corrected Weight of Truss	Decrease in Dead Load Stress	Corrected Maximum Stress	Corrected Section	Weight per Foot	Corrected Centre Line Weight	Corrected Actual Weight	Final Total Weight
A–1	for whole truss = 804 #		2970	+60850	O.K				
B–2		4276							
C–5		804							
D–6		5080 #							
1–2									4148
2–3									804
3–4			680	+16770	2L 3½x2½x¼	4.9	112	108	4952 #
4–5									
5–6									
6–7									
4–7									
X–1			2670	-57750	2L 4x3x⅜	7.2	182	186	
X–3					2L 4x3x⅜	7.2	178	178	
X–7			1530	-29570					
Tie 7–7									
							2091	2074	

for whole truss = 4182 #

for whole truss = 4148 #

Wt. of Details in percent of center line Wt. of truss = 192

Span 80' Rise 20' Distance centre to centre 20'

Member	Wind Load Stress Win'd Side	Wind Load Stress Leew'd Side	Dead Load Stress	Snow Load Stress	Maximum Stress	Centre Line Length	Assumed Section	Weight per Foot	Centre Line Weight	Actual Weight
A–1	+17700	+8700	+36650	+31490	+85840	11.18	2L 6x4x 7/16	14.3	320	331
B–2	"		+34700	+29800	+82200	"	"	"	320	320
C–5	"		+32100	+27600	+77400	"	"	"	320	320
D–6	"		+30600	+26200	+74500	"	"	"	320	324
1–2	+3900		+4160	+3560	+11620	6.0	2L 2½x2x¼	3.7	44	40
2–3	-4400		-4660	-4000	-13060	12.61	2L 2½x2½x¼	4.1	104	94
3–4	+7800		+8400	+7200	+23400	11.41	2L 3½x2½x 7/16	6.1	140	131
4–5	-4400		-4660	-4000	-13060	12.5	2L 2½x2½x¼	4.1	103	94
5–6	+3900		+4160	+3560	+11620	5.71	2L 2½x2x¼	3.7	43	39
6–7	-13100		-14100	-12060	-39260	12.5	2L 3½x2½x¼	4.9	123	115
4–7	-8760		-9400	-8080	-26240	12.5	2L 2½x2½x¼	4.1	103	100
X–1	-19800	-6400	-33000	-28320	-81120	12.64	2L 5x3x 3/8	9.8	247	256
X–3	-15400		-28350	-24300	-68050	12.36	2L 5x3x 3/8	9.8	242	242
X–7	-6700		-18900	-16220	-41820	15.0	2L 5x2½x 7/16	5.6	168	168
Tie 7–7	0		0	0	0	20.0	2L 2½x2x¼	3.7	74	71
									2671	2646

for whole truss = 5342#

for whole truss = 5290#

Member	Weight of Details	Corrected Weight of Truss	Decrease in Dead Load Stress	Corrected Maximum Stress	Corrected Section	Weight per Foot	Corrected Centre Line Weight	Corrected Actual Weight	Final Total Weight
A–1	for whole truss = 974#		4440	+81400	O.K.				
B–2		5290					for whole truss = 5342#	for whole truss = 5290	6264
C–5		974							
D–6		6264#							
1–2									
2–3									
3–4			1020	+22380	O.K.				
4–5									
5–6									
6–7			1710	-37550	O.K.				
4–7									
X–1			4000	-77120	O.K.				
X–3									
X–7			2290	-39530	O.K.				
Tie 7–7									

Wt of Details in per cent of centre line Wt of truss = 18.6

Span 80 Rise 20 Distance centre to centre 25

Member	Wind Load Stress Win'd Side	Wind Load Stress Leew'd Side	Dead Load Stress	Snow Load Stress	Maximum Stress	Centre Line Length	Assumed Section	Weight per Foot	Centre Line Weight	Actual Weight
A–1	+22150	+12130	+48100	+32260	+109500	11.18	2L 6x4x 5/8	20	447	466
B–2	"		+45400	+37200	+104750	"	"	"	447	447
C–5	"		+42000	+34500	+98650	"	"	"	447	447
D–6	"		+40190	+33000	+95340	"	"	"	447	456
1–2	+4870		+5470	+4450	+14790	6.0	2L 2½x2 x¼	3.7	45	39
2–3	-5540		-6130	-5000	-16670	12.61	2L 2½x2½x¼	4.1	104	94
3–4	+9770		+11400	+9000	+30170	11.41	2L 4x3x 7/16	7.2	164	153
4–5	-5540		-6130	-5000	-16670	12.5	2L 2½x2½x¼	4.1	102	94
5–6	+4870		+5470	+4450	+14790	5.71	2L 2½x2x¼	3.7	42	38
6–7	-16400		-18580	-15100	-50080	12.5	2L 3½x3x 9/16	6.6	165	151
4–7	-10950		-12360	-10090	-33400	12.5	2L 3x2½x¼	4.5	113	110
X–1	-24750	-8000	-43500	-35490	-103740	12.64	2L 6x4x 3/8	12.3	311	321
X–3	-19200		-37200	-30100	-86500	12.36	2L 6x4x 3/8	12.3	305	315
X–7	-8390		-24850	-20350	-53590	15.0	2L 3½x3x 5/16	6.6	198	198
Tie 7–7	0		0	0		20.0	2L 3x3x¼	4.9	98	92
									3435	3411

for whole truss = 6670#

for whole truss 6822#

Member	Weight of Details	Corrected Weight of Truss	Decrease in Dead Load Stress	Corrected Maximum Stress	Corrected Section	Weight per Foot	Corrected Centre Line Weight	Corrected Actual Weight	Final Total Weight
A–1	for whole truss 1260#		5310	+104190	O.K.				
B–2		6822							6744
C–5		1260							1260
D–6		8082#							8004#
1–2									
2–3									
3–4			1260	+28910	2L 3½x3x 9/16	6.6	150	140	
4–5									
5–6									
6–7			2050	-48030	2L 3½x2½x 5/16	6.1	152	140	
4–7			1370	-32030	O.K.				
X–1			4800	-98940	2L 6x3½x 3/8	11.7	296	306	
X–3									
X–7			2740	50850	O.K				
Tie 7–7									
							3393	3372	

for whole truss = 6780#

for whole truss = 6744#

Wt of Details in percent of entire Wt of truss. 18.6

Span 80' Rise 20' Distance centre to centre 30'

Member	Wind Load Stress Win'd Side	Wind Load Stress Leew'd Side	Dead Load Stress	Snow Load Stress	Maximum Stress	Centre Line Length	Assumed Section	Weight per Foot	Centre Line Weight	Actual Weight
A–1	+26450	+14550	+59500	+47100	+133050	11.18	T		508	527
B–2	"		+56500	+44700	+127650	"	2L's 5x3½x⅜	10.4	508	508
C–5	"		+53000	+41400	+120860	"	1 PL 8x⅜	11.2	508	508
D–6	"		+50000	+39570	+116070	"	Web 10x ⅜	12.75	508	508
1–2	+5830		+6800	+5340	+17970	6.0	2L's 2½x2x¼	3.7	44	40
2–3	-6590		-7620	-6000	-20210	12.61	2L's 2½x2½x¼	4.1	104	95
3–4	+11650		+13700	+10800	+36150	11.41	2L's 4x3x⅝	7.2	164	157
4–5	-6590		-7620	-6000	-20210	12.5	2L's 2½x2½x¼	4.1	102	94
5–6	+5830		+6800	+5340	+17970	5.71	2L's 2½x2x¼	3.7	42	39
6–7	-19600		-23000	-18090	-60690	12.5	2L's 5x3x⅝	8.2	205	190
4–7	-13100		-15300	-12120	-40520	12.5	2L's 3x2½x⅝	5.6	140	136
X–1	-29600	-9600	-53750	-42480	-125830	12.64	2L's 8"	16.25	413	420
X–3	-23000		-46000	-36450	-105450	12.36	2L's 8"	16.25	402	402
X–7	-10000		-30800	-24330	-65130	15.0	2L's 6"	8.0	239	239
Tie 7–7	0		0	0	0	20.0	2L's 3x3x¼	4.9	98	94
									3985	3957

for whole truss = 7970 #

for whole truss = 7914 #

Member	Weight of Details	Corrected Weight of Truss	Decrease in Dead Load Stress	Corrected Maximum Stress	Corrected Section	Weight per Foot	Corrected Centre Line Weight	Corrected Actual Weight	Final Total Weight
A–1	for whole		6310	+126740			489	497	
B–2	truss =	7914			2L's 5x3½x⅜	10.4	489	489	7666
C–5	1794 #	1794			1 PL 8x⅜	10.2	489	489	1794
D–6		9708 #			Web 10x ⅜	12.75	489	489	9460 #
1–2							44	40	
2–3							104	95	
3–4			1455	+34695	O.K		164	157	
4–5							102	94	
5–6							42	39	
6–7			2450	-58240	2L's 3½x3x⅝	6.6	165	153	
4–7			1620	-38900	O.K.		140	136	
X–1			5700	-120130	O.K.		413	420	
X–3							402	402	
X–7			3280	-61850	O.K		239	239	
Tie 7–7							98	94	
							3869	3833	

for whole truss = 7738 #

for whole truss = 7666 #

Wt of Details is 17 per cent of center line Wt of truss = 23.2.

Span 80' Rise 30' Distance centre to centre 10'

Member	Wind Load Stress Win'd Side	Wind Load Stress Leew'd Side	Dead Load Stress	Snow Load Stress	Maximum Stress	Centre Line Length	Assumed Section	Weight per Foot	Centre Line Weight	Actual Weight
A–1	+7150	+6450	+14330	+11700	+33180	12.5	2L3 4x3x 5/16	7.2	180	184
B–2	"		+12800	+10330	+30280	"	"	"	180	180
C–5	"		+11300	+9250	+27700	"	"	"	180	180
D–6	"		+9940	+8030	+25120	"	"	"	180	182
1–2	+2910		+1980	+1600	+6490	9.8	2L3 2½x2x¼	3.7	73	70
2–3	-2450		-1650	-1330	-5430	15.8	1L 2½x2½x¼	4.1	65	63
3–4	+5790		+3920	+3160	+12070	18.95	2L3 4x3x 5/16	7.2	273	266
4–5	-2450		-1650	-1330	-5430	15.67	1L 2½x2½x¼	4.1	64	62
5–6	+2910		+1980	+1600	+6490	9.48	2L3 2½x2x¼	3.7	70	67
6–7	-7300		-4880	-3940	-16120	15.63	2L3 2½x2½x¼	4.1	128	124
4–7	-4800		-3290	-2650	-10740	15.63	2L3 2½x2½x¼	4.1	128	127
X–1	-8950	-2270	-11400	-9200	-29550	15.88	2L3 2½x2½x¼	4.1	130	131
X–3	-6550		-9750	-7870	-24170	15.52	2L3 2½x2½x¼	4.1	127	127
X–7	-1750		-6450	-5200	-13400	8.6	2L3 2½x2½x¼	4.1	71	71
Tie 7–7	0		0	0	0					
									1849	1834

for whole truss = 3698 #

for whole truss = 3668 #

Member	Weight of Details	Corrected Weight of Truss	Decrease in Dead Load Stress	Corrected Maximum Stress	Corrected Section	Weight per Foot	Corrected Centre Line Weight	Corrected Actual Weight	Final Total Weight
A–1	for whole truss = 566 #		1960	+31220	O.K		for whole truss = 3698	for whole truss = 3668	4234
B–2		3668							
C–5		566							
D–6		4234 #							
1–2									
2–3									
3–4			755	+12115	OK				
4–5									
5–6									
6–7									
4–7									
X–1									
X–3									
X–7									
Tie 7–7									

Wt. of Details in percent of center line Wt. of truss 13.4.

Span 80' Rise 30' Distance centre to centre 15'

Member	Wind Load Stress Win'd Side	Wind Load Stress Leew'd Side	Dead Load Stress	Snow Load Stress	Maximum Stress	Centre Line Length	Assumed Section	Weight per Foot	Centre Line Weight	Actual Weight
A–1	+10700	+9680	+21300	+17600	+49500	12.5'	2L 3½x3½x⅜	10.4	260	265
B–2	"		+19000	+15500	+45200	"	"	"	260	260
C–5	"		+16750	+13850	+41300	"	"	"	260	260
D–6	"		+14750	+12100	+37550	"	"	"	260	264
1–2	+4370		+2930	+2400	+9700	9.8	2L 2½x2x¼	3.7	73	68
2–3	-3660		-2450	-2000	-8110	15.8	2L 2½x2½x¼	4.1	65	62
3–4	+8630		+5810	+4750	+19190	18.95	2L 5x3½x⅜	8.7	329	325
4–5	-3660		-2450	-2000	-8110	15.67	1L 2½x2½x¼	4.1	63	62
5–6	+4370		+2930	+2400	-9700	9.48	2L 2½x2x¼	3.7	70	67
6–7	-10930		-7210	-5900	-24040	15.63	2L 2½x2½x¼	4.1	128	122
4–7	-7200		-4860	-3980	-16040	15.63	2L 2½x2½x½	4.1	128	127
X–1	-13400	-3410	-16900	-13800	-44100	15.88	2L 3½x2½x⅜	6.1	194	196
X–3	-9800		-14400	-11800	-36000	15.52	2L 3½x2½x⅜	6.1	190	190
X–7	-2630		-3550	-7800	-13980	8.6	2L 2½x2½x¼	4.1	71	71
Tie 7–7	No tie used									
									2352	2339

for whole truss = 4704#

for whole truss = 4678#

Member	Weight of Details	Corrected Weight of Truss	Decrease in Dead Load Stress	Corrected Maximum Stress	Corrected Section	Weight per Foot	Corrected Centre Line Weight	Corrected Actual Weight	Final Total Weight
A–1	for whole truss = 644#	4678	2000	+47500	O.K.		for whole truss = 4704#	for whole truss = 4678#	5322#
B–2		644							
C–5		5322#							
D–6									
1–2									
2–3									
3–4			550	+18640	O.K.				
4–5									
5–6									
6–7									
4–7									
X–1			1600	-42500	O.K.				
X–3									
X–7									
Tie 7–7									

Wt of Details in per cent of centerline Wt. of truss = 13.7

Span 80' Rise 30' Distance centre to centre 20'

Member	Wind Load Stress Win'd Side	Wind Load Stress Leew'd Side	Dead Load Stress	Snow Load Stress	Maximum Stress	Centre Line Length	Assumed Section	Weight per Foot	Centre Line Weight	Actual Weight
A–1	+14300	+12900	+30450	+23450	+68200	12.5	2L 6x4x3/8	12.3	308	313
B–2	"		+27130	+20700	+62130	"	"	"	308	308
C–5	"		+24100	+18500	+56800	"	"	"	308	308
D–6	"		+21100	+16050	+51450	"	"	"	308	310
1–2	+5820		+4200	+3200	+13220	9.8	2L 2½x2½x¼	4.1	80	74
2–3	-4900		-3500	-2660	-11060	15.8	1L 2½x2½x¼	4.1	66	62
3–4	+11580		8350	+6320	+26250	18.95	2L 5x3½x⅜	10.4	396	385
4–5	-4900		-3500	-2660	-11060	15.67	1L 2½x2½x¼	4.1	65	62
5–6	+5820		+4200	+3200	+13220	9.48	2L 2½x2½x¼	4.1	78	73
6–7	-14600		-10380	-7880	-32860	15.63	2L 3x2½x¼	4.5	141	134
4–7	-9600		-7000	-5300	-21900	15.63	2L 2½x2½x¼	4.1	128	126
X–1	-17900	-4550	-24200	-18400	-60500	15.88	2L 5x3x⅝	8.2	261	266
X–3	-13100		-20700	-15740	-49540	15.52	2L 5x3x⅝	8.2	255	255
X–7	-3500		-13700	-10400	-27600	8.6	2L 2½x2½x¼	4.1	71	71
Tie 7–7										
									2772	2747

for whole truss = 5541#

for whole truss = 5494#

Member	Weight of Details	Corrected Weight of Truss	Decrease in Dead Load Stress	Corrected Maximum Stress	Corrected Section	Weight per Foot	Corrected Centre Line Weight	Corrected Actual Weight	Final Total Weight
A–1	for whole truss = 748#		3300	+46900	O.K.				
B–2		5494							5368
C–5		748							748
D–6		6242#							6116#
1–2									
2–3									
3–4			909	+25340	O.K				
4–5									
5–6									
6–7			1120	-31740	O.K.				
4–7									
X–1			2625	-57875	2L 4x3x⅝	7.2	230	234	
X–3					2L 4x3x⅝	7.2	224	224	
X–7									
Tie 7–7							2710	2684	

for whole truss = 5368#

Wt. of Details in per cent of centre line Wt. of truss. 13.8.

Span 80' Rise 30' Distance centre to centre 25'

Member	Wind Load Stress Win'd Side	Wind Load Stress Leew'd Side	Dead Load Stress	Snow Load Stress	Maximum Stress	Centre Line Length	Assumed Section	Weight per Foot	Centre Line Weight	Actual Weight
A–1	+17800	+16100	+38190	+29250	+85240	12.5	2L 6x4x½	16.2	405	420
B–2	"		+34100	+25800	+77700	"	"	"	405	405 #
C–5	"		+30100	+23190	+71090	"	"	"	405	405 #
D–6	"		+26300	+20000	+64300	"	"	"	405	410
1–2	+7280		+5280	+4000	+16560	9.8	2L 3x2½x¼	4.5	88	82
2–3	-6100		-4400	-3070	-13570	15.8	1L 2½x2½x¼	4.1	65	63
3–4	+14400		+10450	+7900	+32750	18.95	2L 5x3½x⅜	10.4	395	380
4–5	-6100		-4400	-3070	-13570	15.67	1L 2½x2½x¼	4.1	64	62
5–6	+7280		+5280	+4000	+16560	9.48	2L 3x2½x½	4.5	85	80
6–7	-18200		-13000	-9850	-41050	15.63	2L 3x2½x⅝	5.6	176	169
4–7	-11250		-8750	-6620	-27320	15.63	2L 2½x2½x¼	4.1	128	126
X–1	-22400	-5680	-30400	-23000	-75800	15.88	2L 5x3x⅜	9.8	312	320
X–3	-16300		-26000	-19600	-61300	15.52	2L 5x3x⅜	9.8	304	304
X–7	-4370		-17200	-13000	-34570	8.6	2L 3x2½x¼	4.5	77	77
Tie 7–7	—								for whole truss = 6628 #	for whole truss = 6606 #
									3314	3303

Member	Weight of Details	Corrected Weight of Truss	Decrease in Dead Load Stress	Corrected Maximum Stress	Corrected Section	Weight per Foot	Corrected Centre Line Weight	Corrected Actual Weight	Final Total Weight
A–1	for whole		4210	+81030	2L 6x4x⅞	14.3	358	370	
B–2	truss =	6606			"	"	358 #	358 #	6052
C–5	1060 #	1060			"	"	358	358	1060
D–6		7666 #			"	"	358	362	7112 #
1–2			580	+15980	2L 2½x2½x¼	4.1	80	75	
2–3							65	63	
3–4			1150	+31600	O.K		395	380	
4–5							64	62	
5–6			580	+15980	2L 2½x2½x¼	4.1	77	73	
6–7			1435	-39615	O.K		176	169	
4–7			960	-26360	O.K		128	126	
X–1			3350	-72450	2L 5x3½x⅝	8.7	277	284	
X–3							269	269	
X–7			1900	-32670	O.K		77	77	
Tie 7–7							for whole truss = 7094	for whole truss = 6052 #	
							3038	3028	

Wt of Details in per cent of centre line Wt of truss = 17.5

Span 80' Rise 30' Distance centre to centre 30'

Member	Wind Load Stress Win'd Side	Wind Load Stress Leew'd Side	Dead Load Stress	Snow Load Stress	Maximum Stress	Centre Line Length	Assumed Section	Weight per Foot	Centre Line Weight	Actual Weight
A–1	+21450	+19300	+47600	+35100	+104150	12.5'	2L3 6x4x 9/16	18.1	451	470
B–2	"		+42500	+30900	+94850	"	"	"	451	451
C–5	"		+37600	+27700	+86750	"	"	"	451	451
D–6	"		+33000	+24200	+78650	"	"	"	451	458
1–2	+8740		+6590	+4800	+20130	9.8	2L3 2½x2½x¼	4.1	80	75
2–3	-7350		-5480	-3990	-16820	15.8	1L 3x2½x¼	4.5	71	68
3–4	+17300		+13300	+9500	+40100	18.95	2L3 6x4x⅜	12.3	465	450
4–5	-7350		-5480	-3990	-16820	15.67	1L 3x2½x¼	4.5	70	68
5–6	+8740		+6590	+4800	+20130	9.48	2L3 2½x2½x¼	4.1	77	73
6–7	-21800		-16200	-11800	-49800	15.63	2L3 3½x3x 5/16	6.6	207	198
4–7	-14400		-10900	-7950	-33250	15.63	2L3 3½x2½x¼	4.9	154	151
X–1	-26800	-6800	-38000	-27600	-92400	15.88	2L3 6x3½x⅜	11.7	374	381
X–3	-19600		-32450	-23300	-75350	15.52	2L3 6x3½x⅜	11.7	364	364
X–7	-5250		-21500	-15600	-42350	8.6	2L3 3x2½x 5/16	5.6	96	96
Tie 7–7										
									3762#	3754#

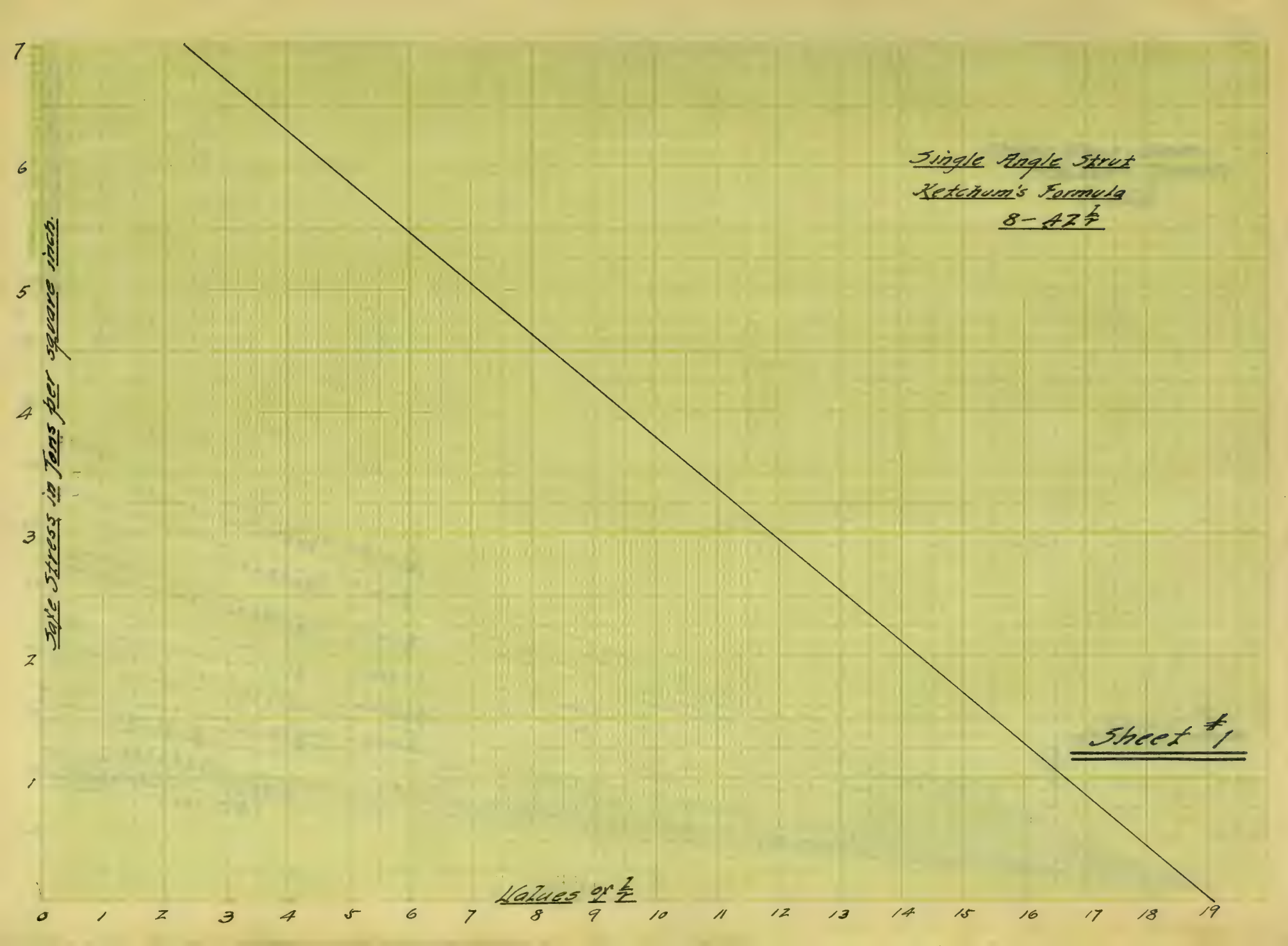
for whole truss = 7508#

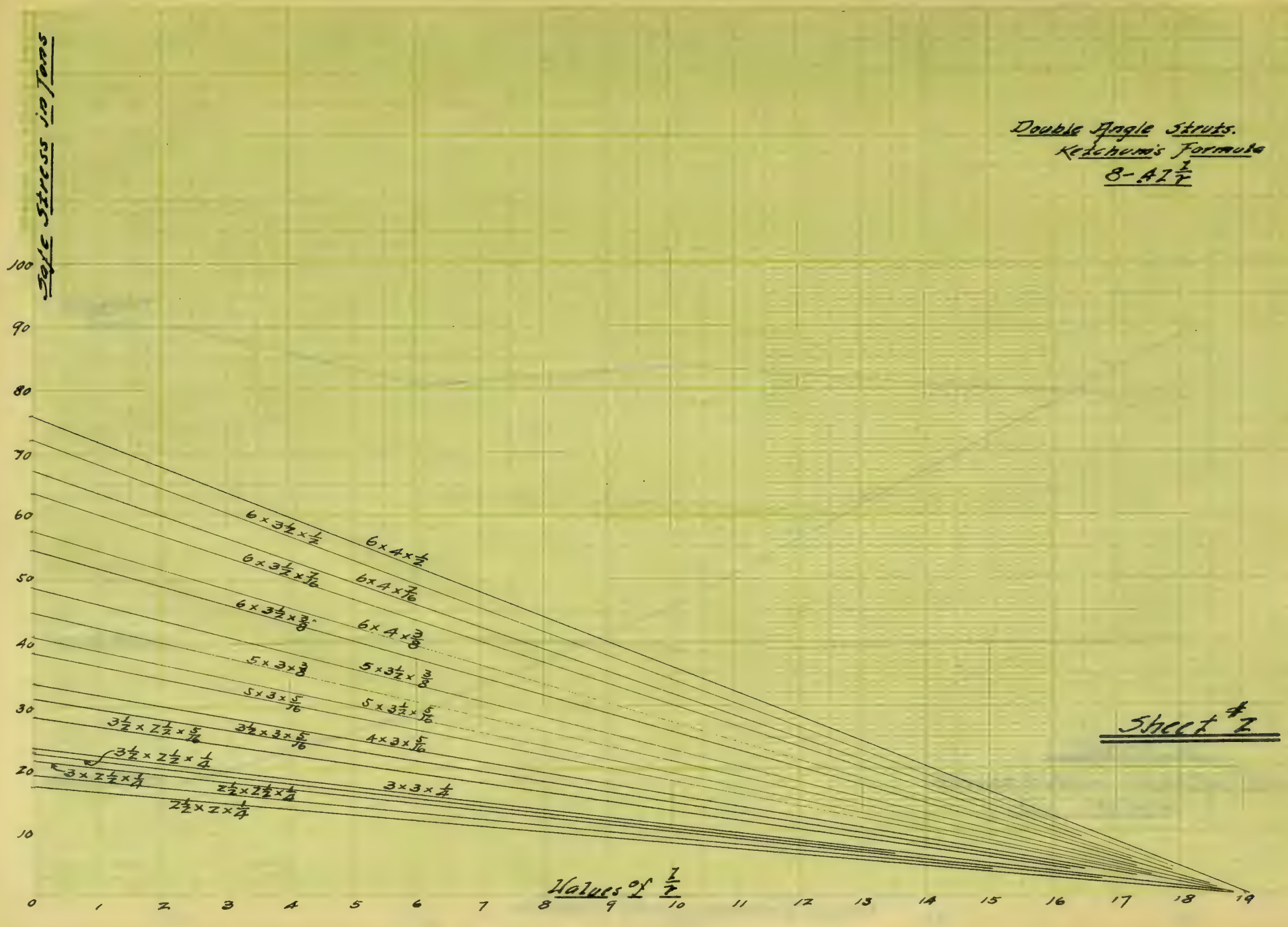
for whole truss = 1370#

Member	Weight of Details	Corrected Weight of Truss	Decrease in Dead Load Stress	Corrected Maximum Stress	Corrected Section	Weight per Foot	Corrected Centre Line Weight	Corrected Actual Weight	Final Total Weight
A–1	for whole		5300	+98850	O.K		451	470	
B–2	truss =	7508					451	451	7454
C–5	1370#	1370					451	451	1370
D–6		8878#					451	458	8824#
1–2			730	+19400	2L3 2½x2½x¼	4.1	80	75	
2–3							71	68	
3–4			1480	+38620	O.K		465	450	
4–5							70	68	
5–6			730	+19400	2L3 2½x2½x¼	4.1	77	73	
6–7			1800	-48000	2L3 3½x2½x 5/16	6.1	132	183	
4–7			1210	-32040	2L3 3x2½x¼	4.5	142	139	
X–1			4220	-88180	O.K		374	381	
X–3							364	364	
X–7			2380	-39970	O.K		96	96	
Tie 7–7							3735#	3727#	

for whole truss = 7454#

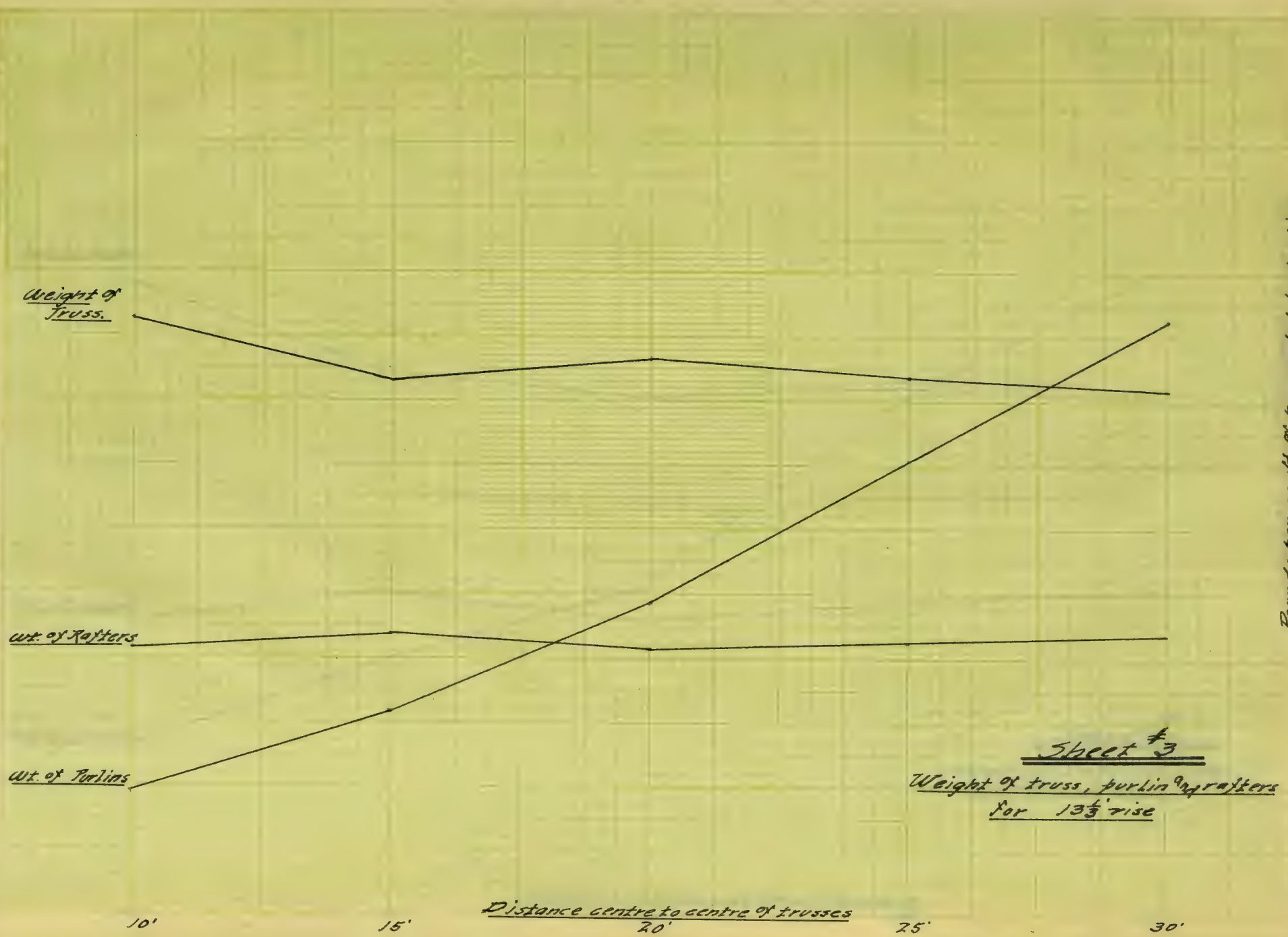
Wt. of Details is 18.4 per cent of Centre Line Weight of Truss = 18.4


Single Angle Strut
Ketchum's Formula
8 − 4Z/r
Safe Stress in Tons per square inch.
Values of l/r
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
1 2 3 4 5 6 7
Sheet #1



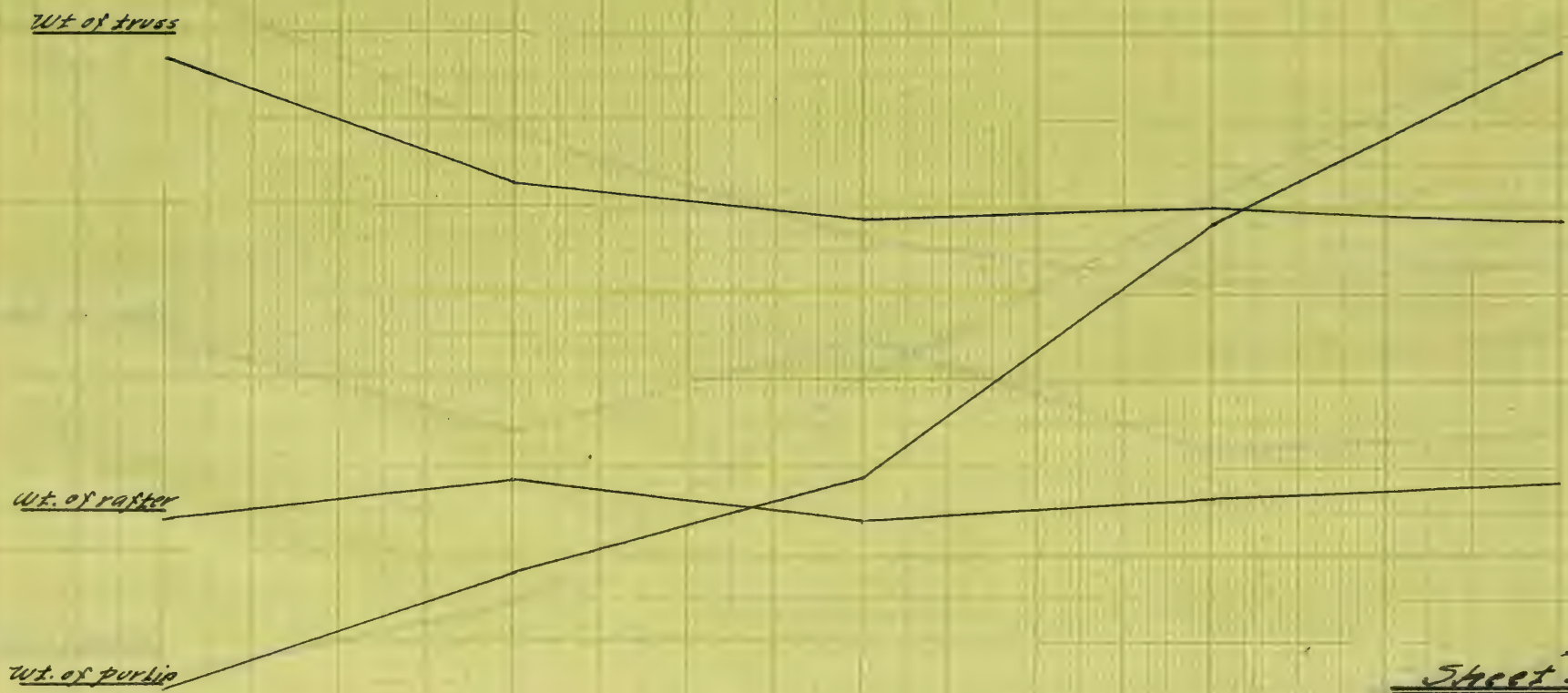
Double Angle Struts.
Ketchum's Formula
8-Al $\frac{l}{r}$

Sheet 4 2



Sheet #3

Weight of truss, purlins & rafters for 13½' rise



Sheet 4

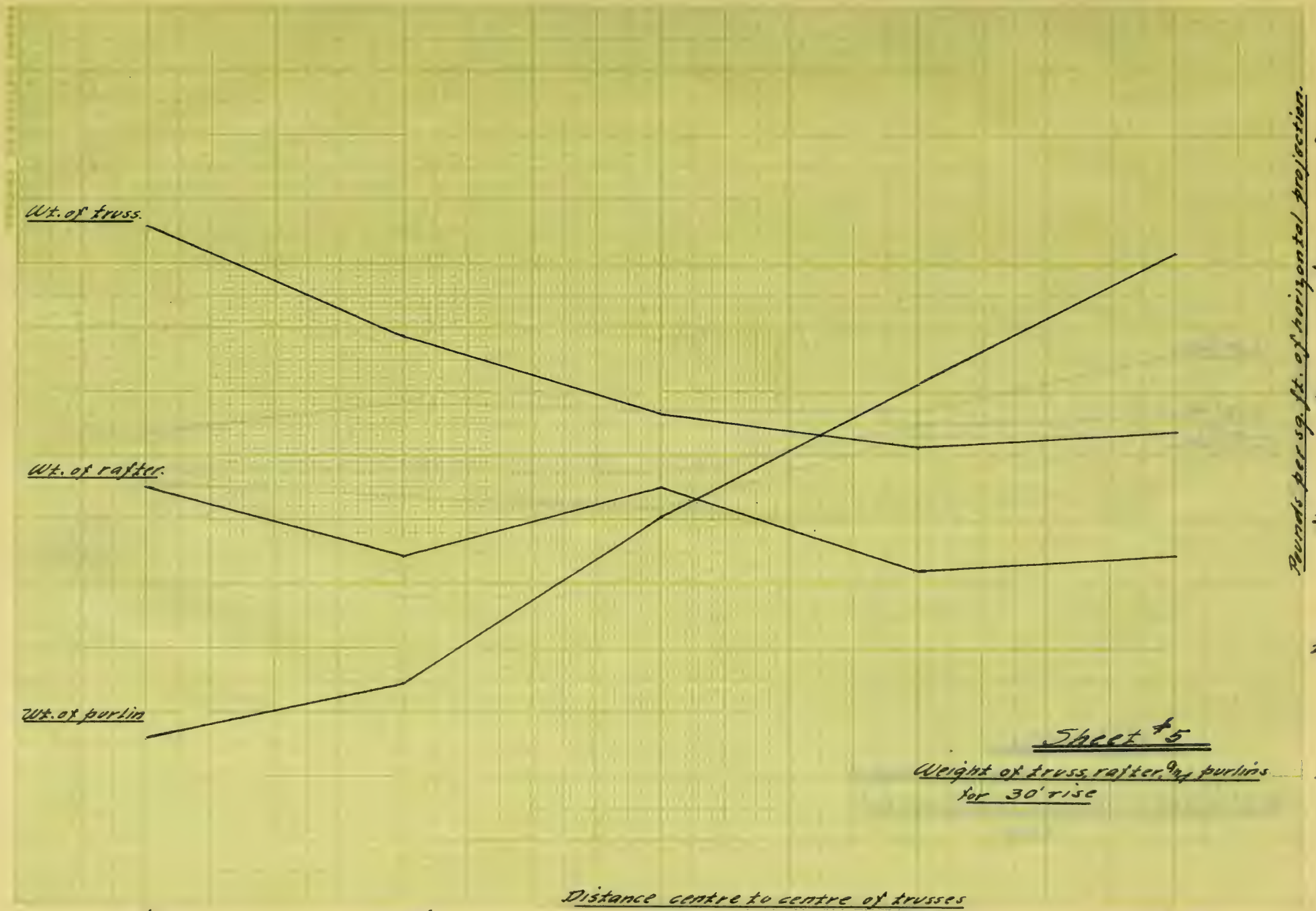
Weight of truss, purlin and rafters. for 20' rise

Pounds per sq. ft of horizontal projection.

5
4
3
2
1

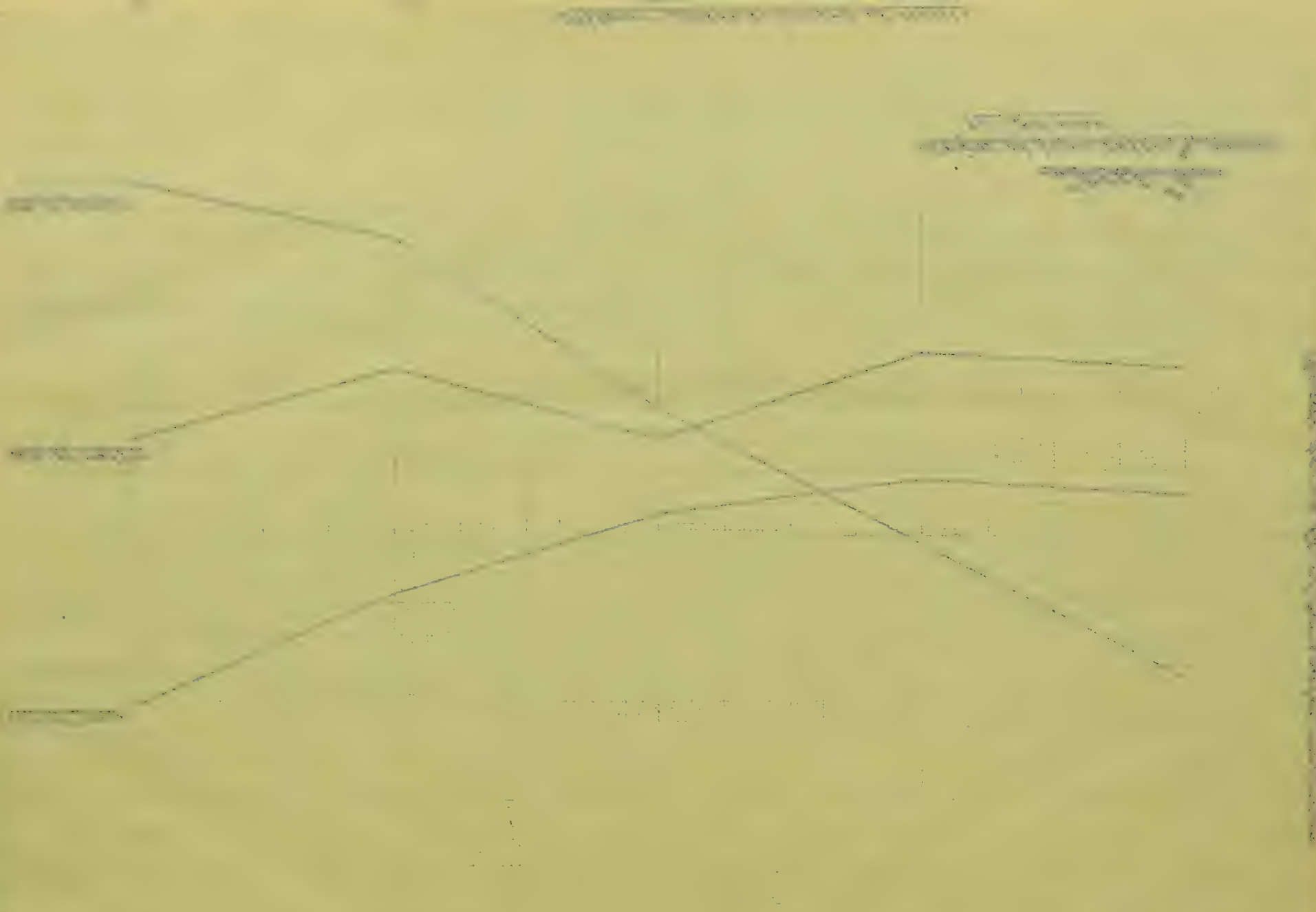
Distance centre to centre of trusses

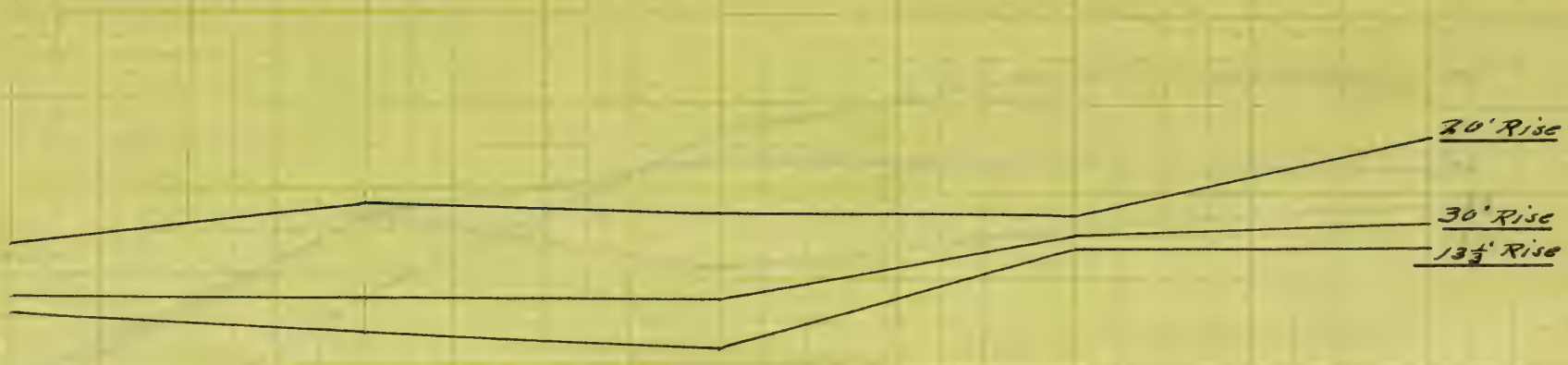
10' 15' 20' 25' 30'



Sheet #5

Weight of truss, rafter & purlins for 30' rise





30
20
10
0

Percent weight

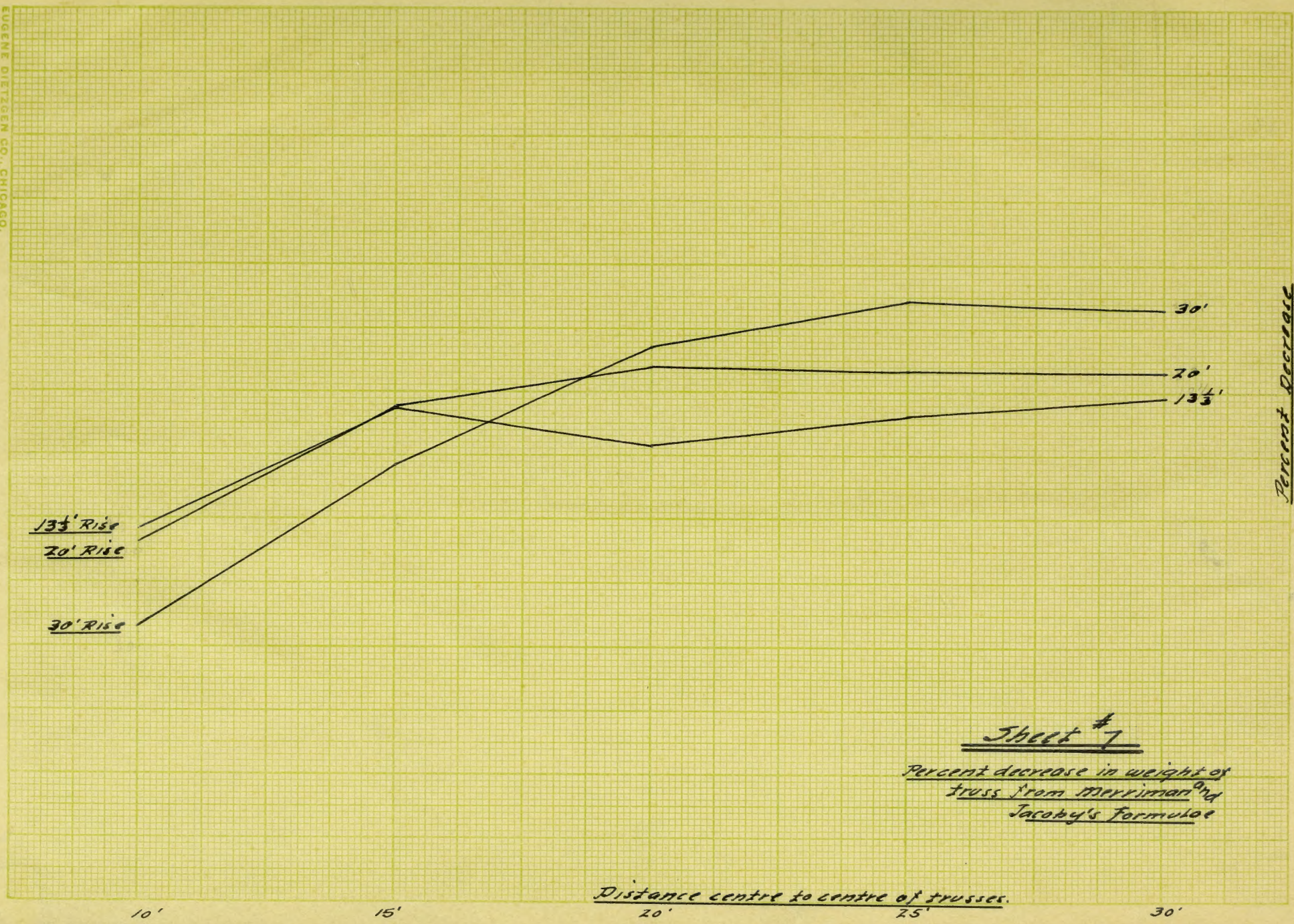
Sheet #6

Weight of details, in percent of centre line weight of trusses of 13⅓', 20' & 30' rise

Distance centre to centre of trusses.

10' 15' 20' 25' 30'

EUGENE DIETZGEN CO., CHICAGO.



Sheet #7

Percent decrease in weight of truss from Merriman and Jacoby's formulae

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3 0112 086763312